

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 63, 64, 65, 67, 72, 73, 74, 78, 79, 80, 82, 87, 88, 92, 125, 126, 131, and 132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pizzi (EP 1026718), in further view of Nelson (US 6787438). Pizzi teaches an electrostatic actuation device with at least one mobile membrane 3 that is flexible and free to move with respect to a substrate 2, which has an electrical contact element 10 fixed on thereto. Pizzi teaches at least two fixed electrodes 5, 6, on the substrate 2 which are located on a same side and facing the mobile membrane 3. Pizzi teaches the contacts 11, 12 providing a means for forming at least one pivot of at least one portion of the mobile membrane 3, wherein each of the at least two fixed electrodes 5, 6 are configured to progressively force the mobile part of the mobile electrode facing each of the fixed electrodes(see figures 1, 6, and 8), respectively, to contact the substrate 2 as a function of applied voltage and the mobile part 3, 10 bears on the means forming at least one pivot 11, 12 when only one of the fixed electrodes attracts a first portion of the mobile part of the mobile electrode (left side) facing the fixed electrode (see fig. 6), and another portion of the mobile part of the mobile electrode is configured to move away (right side) from the substrate 2 by mechanical return forces, thereby moving the

Art Unit: 2834

electrical contact between a high position and a low position (fig. 6 showing a high contact position for contact 10 (on the right side), fig. 8. showing a low position for contact 10 (on the right side). Pizzi teaches the pivot are the contacts, where Pizzi teaches every aspect of the invention except the pivot being directly under the mobile part that is flexible and free to move and the moving membrane bearing directly on the pivot. Nelson teaches the moving membrane 52 over and bearing directly on the pivot contact 42 to selectively pass signals between the contacts 41, 42, and 43 (see figs. 5-9). It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator of Pizzi with the moving member being over and directly bearing on pivot to selective pass signals between the a plurality of contacts, as taught by Nelson, and because it has been held that to rearrange parts of an invention only involves routine skill in the art. (see *In re Japikse*, 86 USPQ 70).

In regards to claim 64, Pizzi teaches the mobile membrane 3 extends in the height direction perpendicular to the substrate (see figure 3).

In regards to claim 65, Pizzi teaches the fixed electrodes 5, 6 separated by insulation layer 7 from the mobile electrode 3.

In regards to claim 67, Pizzi shows the pivot 11, 12 to be fixed to the substrate 2.

In regards to claim 72, Pizzi teaches the mobile membrane 3 is fixed to the substrate insulation 7 on the ends (See fig. 3).

In regards to claim 73, Pizzi teaches each fixed electrode 5, 6 being located to face at least one end of the mobile membrane 3 (respectively) on one side of the means for forming the at least one pivot 11,12 (see fig. 3).

In regards to claim 74, Pizzi teaches the mobile membrane 3 having at least two mobile parts supporting the contacts 10, each mobile part being free to move at one of its ends (the contact end), and fixed to the substrate 2 at the other end (see fig. 3).

In regards to claim 78, Pizzi and Nelson teach every aspect of the invention, as discussed above except the mobile part having at least two electrodes separated by an insulating part. Nelson teaches the moving member has two electrodes 56, 58 separated by an insulator 57. It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator of Pizzi with the mobile part having at least two electrodes separated by an insulating part. to selective pass signals between the a plurality of contacts, as taught by Nelson.

In regards to claim 79, Pizzi teaches the mobile part 3 is free to at to move perpendicular to the substrate 1.

In regards to claim 80, 92, Pizzi teaches two fixed electrodes 5, 6.

In regards to claim 82, Pizzi shows the pivot 11, 12 to be fixed to the substrate 2

In regards to claim 87, Pizzi teaches the mobile membrane 3 is fixed to the substrate insulation 7 on the ends (See fig. 3).

In regards to claim 88, Pizzi teaches the mobile membrane 3 having at least two mobile parts supporting the contacts 10, each mobile part being free to move at one of its ends (the contact end), and fixed to the substrate 2 at the other end (see fig. 3).

In regards to claim 125 and 126, Pizzi teaches the contact element 10 close a circuit track 13 at the low position.

In regards to claims 131,132, Pizzi teaches the contact element 10 closes a circuit track 13 at the low position.

3. Claims 128-130 and 139-141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pizzi (EP 1026718) and Nelson (US 6787438), in further view of Feng et al. (Feng)(US 6919784). Pizzi and Nelson teach every aspect of the invention except the electrical contact element forms an armature, the device includes another armature being fixed with respect to the substrate to form a variable capacitor, variable capacitor has continuous operations between the high and low positions, and variable capacitor has stable positions between the high and low positions. Feng teaches the electrostatic actuator switches are variable capacitors when the contacts are controlled to not make contact (col. 4, lines 1-10). The variable capacitor having continuous operations between the high and the low positions based on a continuously increasing voltage applied to the actuator, and where the position is stable based upon the applied steady voltages to the electrodes. It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator of Pizzi and Nelson with the electrical contact element forms an armature, the device includes another armature being fixed with respect to the substrate to form a variable capacitor, variable capacitor has continuous operations between the high and low positions, and variable capacitor has stable positions between the high and low positions to provide an alternate use of the actuator as a switch or variable capacitor as taught by Feng.

Art Unit: 2834

4. Claim 101 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pizzi (EP 1026718) and Nelson (US 6787438), in further view of Fleming (US 5867302).

Pizzi and Nelson teach every aspect of the invention except the means for forming the pivot being used to hold a point of a mobile electrode at a height of between 50 nm and 20 μ m with respect to the substrate. Fleming teaches the spacing between the electrostatic electrodes is between 0.5 – 2 μ m (sacrificial layer 26 forming the gap, col. 4, line 43). It would have been obvious to a person of ordinary skill in the electrostatic actuator art to construct the actuator of Pizzi and Nelson with the means for forming the pivot being used to hold a point of a mobile electrode at a height of between 50 nm and 20 μ m with respect to the substrate optimize the capacitance of the actuator, as taught by Fleming to provide an effective electrostatic actuator.

Response to Arguments

5. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new grounds of rejection.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai at telephone number is (571) 272 - 2036.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mrs. Quyen Leung, can be reached at (571) 272 - 8188. The facsimile number for the Group is (571) 273 - 8300.

Art Unit: 2834

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Karl I Tamai/
PRIMARY PATENT EXAMINER
February 22, 2012